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REMARKS

AUG 24 2007

This paper is responsive to the Office Action dated May 25, 2007. Applicants have not amended any of the claims. Claims 30-46 remain pending.

Allowable Subject Matter

In the Office Action, the Examiner indicated that claims 30-35 are allowable in their present form. Applicants thank the Examiner for these favorable remarks.

Claim Rejections Under 35 U.S.C. § 102 and 35 U.S.C. § 103

In the Office Action, the Examiner rejected claims 36-39 and 41 under 35 U.S.C. 102(b) as being anticipated by Suzuki (US 4,947,384). The Examiner rejected claim 40 under 35 U.S.C. 103(a) as being obvious over Suzuki '384. The Examiner rejected claims 42-46 under 35 U.S.C. 102(b) as being anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Suzuki '384.

Applicants respectfully traverse the rejections. The passages of Suzuki '384 relied upon by the Examiner are mis-translations of the Japanese priority document. In particular, the term "μm" ("micrometer") in Suzuki '384 was mistranslated to "μin" ("microinches"). The term "μm" does not translate directly to "μin," but requires metric-to-English conversion of the units. The mis-translation in Suzuki '384 is very apparent as the dimensions of Suzuki '384, listed as being conventional, are clearly meant to be micrometers rather than microinches.

Furthermore, the teaching of Suzuki '384 is non-enabling of the listed dimensions in microinches. Given the fact that the listed dimensions in Suzuki '384 are clearly mis-translated, and the fact that the teaching of Suzuki '384 fails to enable any way to achieve such dimensions in a stamper for use in creating replica disk substrates, the rejections must be withdrawn.

Translation Error in Suzuki

Attached with this response is a translation of the background section of Japanese Application 62-90081, which is the Japanese priority document to Suzuki '384. As can be seen in this document, Japanese Application 62-90081 describes conventional track pitches as being 1.6 μm (micrometers), which corresponds to 1600 nanometers. Japanese Application 62-90081

also describes the width of the guiding groove as being 0.8  $\mu\text{m}$  (micrometers), which corresponds to 800 nanometers.

Suzuki '384 was mis-translated. In particular, the term " $\mu\text{m}$ " was translated to " $\mu\text{in.}$ " However, the term " $\mu\text{m}$ " does not accurately translate directly to " $\mu\text{in.}$ " and Suzuki '384 fails to contemplate the disclosed dimensions in " $\mu\text{in.}$ " Specifically, the term " $\mu\text{m}$ " does not translate directly to " $\mu\text{in.}$ " but requires metric-to-English conversion of the units, which appears to have been mistakenly overlooked in Suzuki '384.

Suzuki '384 provides nothing more than a mis-translation of the term " $\mu\text{m}$ ". It is this mis-translation, and not the actual teaching of Suzuki '384, that corresponds to the dimensions recited in Applicants' claims.

The fact that Suzuki '384 provides nothing more than a mis-translation of the term " $\mu\text{m}$ " is apparent from the teaching of Suzuki '384. In particular, Suzuki '384 discusses the 1.6  $\mu\text{in}$  track pitches in the Background section, e.g., implying that such track pitches were conventional at the time of the filing of Suzuki '384. However, at the time of the Suzuki '384 patent filing, 1.6  $\mu\text{m}$  track pitches were conventional for compact disc (CD) formats, not 1.6  $\mu\text{in}$  track pitches. Clearly, Suzuki '384 contemplated 1.6  $\mu\text{m}$  track pitches as the conventional "Background" art, and not 1.6  $\mu\text{in}$  track pitches, as provided by the mis-translation. One of ordinary skill in the art would have immediately recognized this discrepancy.

Suzuki is Non-Enabling of the Dimensions Required by Applicants' Claims

Suzuki (US 4,947,384) and its priority document JP 62-90081 are in agreement with regard to all of the commonly available information, with the exception that JP 62-90081 expresses the track pitch as 1.6 micrometers and groove dimension of 0.8 micrometers. Track pitch of 1.6 micrometers and groove dimensions of 0.8 micrometers are consistent with conventional dimensions of the filing period of Suzuki '384, while 1.6 microinch track pitch and groove dimensions of 0.8 microinch are far smaller than any conventional optical recording processes were capable of at the priority date and filing date of Suzuki '384.

The relied upon passages of Suzuki merely describe the standard mastering processes of focused scanning laser beam exposure using single layer photoresist. This was conventional and commonly practiced for the 1.6 micrometer track pitch and 0.8 micrometer groove dimension

described in priority JP 62-90081. Suzuki '384 refers to the conventional nature of this background teaching frequently in the background section, and then describes the invention of Suzuki '384 in Summary and Detail Description sections. The description of Suzuki '384 describes "the spot diameter of the laser beam for read-out is ordinarily within the width of the land portion" (col.1, line 50-54) and also describes tracing singular land portions using said laser spot (col.1, lines 39,40) and laser beam actuated to trace out singular land portion (col.1, line 45).

Clearly, one of ordinary skill in the art would recognize that all of these descriptions are unattainable for track pitches that are much smaller than the focal spot size of the laser beam.

The present application, in contrast, describes the optical physics limitation of a focused laser spot size as depending on wavelength and lens numerical aperture, with limitations of 220 nm even for UV light (350nm wavelength) and highest Numerical Aperture (NA=0.92). Suzuki '384 does not enable any 40nm laser spot size that would be required to attain to track pitch dimensions of 1.6 microinch and groove dimension of 0.8 microinch. The mis-translated dimensions of 1.6 microinch track pitch and of 0.8 microinch groove dimensions are not enabled.

As further evidence that the teaching of Suzuki '384 is descriptive of conventional track pitches at 1.6 micrometer and conventional groove dimensions of 0.8 micrometer (rather than microinches), Applicants note that Suzuki '384 describes the optical push-pull tracking method in col. 1, lines 60-65, as justification for the dimensions cited by the Examiner. The push-pull method, as it is commonly called, relies on the optical diffraction of the incident focused laser light into +/- 1<sup>st</sup> order diffraction beams, which interfere with the zero order reflected beam to create a trackable signal from a split tracking detector. If Suzuki '384 actually contemplated a 40nm track pitch, then no optical diffraction would occur since the diffraction grating would be significantly less than the incident wavelength (hence resulting in no push-pull tracking signal). Furthermore, Suzuki's teaching does not enable any way to obtain an optical diffraction pattern from a pattern of sub-optically diffracting pitch (i.e., 40nm), but instead presumes conventional tracking means, which is consistent with 1.6 micrometer pitch of priority document JP 62-90081.

In addition, Suzuki '384 teaches a laser beam focused on a photoresist layer for the mastering step (see col. 2, line 4-6), but does not provide any enabling disclosure that describes how to provide 40nm dimension laser spot size (which is actually below the limits of optical physics at ~220nm).

In short, Suzuki '384 describes conventional processes from the time frame of the filing of Suzuki '384 (e.g., 1987-1988), and fails to address any of the challenges of translating 1.6 micrometers track pitches to 1.6 microinches (40nm) track pitches. On the contrary, Suzuki '384 teaches conventional processes from the time frame of 1987-1988, consistent with the dimensions cited in priority document JP 62-90081. Suzuki simply fails to disclose any way to attain track pitches anywhere near 1.6 microinches, or groove dimensions anywhere near 0.8 microinch.

Groove bottom width has not been properly addressed by the Examiner

In addition to the arguments above, Applicants also note that the Examiner has not properly addressed the groove width features of Applicants' claims. For example, claim 36 specifically recites stamper grooves that extend down into the stamper surface, wherein the stamper grooves define stamper groove bottoms that have a width that is greater than 25 percent of the track pitch. Claim 40 defines stamper groove bottoms that have a width that is greater than 50 percent of the track pitch.

In addressing these stamper groove bottom width features of claims 36 and 40, the Examiner relied upon the discussion of "groove dimensions" discussed in Suzuki '384. Groove dimensions, per Suzuki '384, however, appear to refer to the average width of the grooves, and not the width of groove bottoms. Conventional groove bottoms are much narrower than the "groove dimensions" defined by Suzuki '384. Accordingly, Applicants submit that the Examiner has failed to properly address the claim limitation of claim 36 that requires groove bottoms that have a width that is greater than 25 percent of the track pitch, and failed to meet the required burden of proof on this issue. With regard to claim 40, it should be very apparent that the "groove dimensions" discussed in Suzuki '384 (e.g., near 50 percent of the track pitch) would not define groove bottom widths that are even close to 50 percent of the track pitch.

Track pitch less than 2 multiplied by a laser spot size is a structural feature

With regard to claim 42, the Examiner stated that the limitation "track pitch less than 2 multiplied by a laser spot size associated with a laser used to perform laser etching" is a method step. Applicants disagree. This feature is a structural limitation of the media, i.e., a structural

limitation of the track pitch. In this case, the track pitch is simply defined relative to a laser spot size associated with a laser used to perform laser etching. Nothing in Suzuki '384 discloses or suggests a track pitch less than 2 multiplied by a laser spot size associated with a laser used to perform laser etching, and contrary to the Examiner's conclusions, this feature is not a method step.

**Conclusion**

All claims in this application are in condition for allowance. In view of the foregoing arguments, Applicants respectfully request reconsideration and prompt allowance of all pending claims. Please charge any additional fees or credit any overpayment to deposit account number 09-0069. The Examiner is invited to telephone the below-signed attorney to discuss this application.

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## Publicized Report of Japan Patent

Japan Patent Department (JP)

No. S 63-255846

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Request for examination: pending  
Numbers of requested claims: 1

Name of invention: optical disk with guiding groove

Application number: No. S 62-90081

Application date: April 13, 1987

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Detailed report

(Background of the invention)

An optical disk with a guiding groove, for example, is shown in figure 4. The lower surface of a transparent circular substrate 1 which consists of PMMA, PC, etc., has grooves and projections in concentric circles or in a whirlpool shape. A reflective layer 5 covers this entire lower surface, along with a guiding groove 2 and a land 3. The land part 3 has pre-address pits 4 already formed. In addition, the guiding groove 2 and land 3 correspond to projections and grooves on the reflective layer 5 when viewed from the side which is irradiated by the laser beam for reading, writing. This substrate 1 forms an

optical disk with a guiding groove when it is attached to another substrate 7 via a spacer 6 so that the inner space with the reflective layer 5 as the inner surface.

Figure 5 is a partially enlarged top view of an optical disk with a guiding groove. The land 3 forms a track, and the part which is shown by F is the pre-format part with pre-address pits 4 already formed corresponding to an address signal. The part shown by R is the recording part where pits 9 are added as pits information by a laser later. The reflective layer 5 is formed from, for example, an organic color element, which is sublimed or evaporated by a laser spot of predetermined power to form the recording layer.

During the writing operation for this optical disk with a guiding groove, a laser beam is used to irradiate the substrate 1. This laser spot follows the land and the address signal is read by reflected light from the pre-address pits 4 of the pre-format part F. Then pits 9, that is, information are recorded in the recording part R. Next, during reading, the laser beam for reading follows the land part 3, and the address is read from the pre-address pits 4 of the pre-format part. The laser is operated so that it reads information from the pits 9 which has been recorded in the recording part R. A tracking servo is used to make the laser beam to follow the land. The spot diameter of the laser beam for reading is bigger than the diameter of the laser beam for writing within the land. It is also bigger than the area with the pre-address pits.

Accordingly, in order to make the servo cause the laser beam to follow the land to read the disk, the optical disk must have a guiding groove that increases tracking error signal and cross track signal by amplifying the light diffracted by the guiding groove. For example, in order to maximize the tracking error signal by push-pull methods with  $\lambda/8$  depth of guiding groove and  $1.6 \mu\text{m}$  track pitch, the maximum signal can be obtained if the width of the guiding groove is  $0.8 \mu\text{m}$ .  $\lambda$  is the wavelength of the laser light, and the track pitch is the center distance between adjacent pairs of guiding grooves on the land.

In order to satisfy these conditions, the manufacturing process for optical disks with guiding grooves used a laser to expose photo resist while rotating the glass master disk. Next, the master disk is developed, and U shaped guiding grooves are formed in the radial direction. The guiding grooves with U shaped horizontal section so-called hit bottom, i.e. the grooves go through the photo resist layer and expose the glass disk. "U shaped" does not express the relationship between the width and depth of the grooves, but it means that the bottom of the groove is rounded.

It is possible to make optical disks with guiding grooves by arranging a reflective layer the main surface which carries the guiding groove and land part of the glass master disk. However, metal stamper is usually made from a material such as nickel using the glass master disk as the mother mold, and large number of PMMA optical disks are made from the stamper. A reflective layer is formed on the substrate, and the optical disk with guiding grooves shown in figure 4 is acquired.

With optical disks with guiding grooves of the prior art, the laser beam for writing and reading tends to catch the edge of the guiding groove in many cases. Because of this, the degree of reflected light from the pre-formatted part drops, and this may cause errors reading the address signal.